The Open Court.

A WEEKLY JOURNAL

Devoted to the Work of Conciliating Religion with Science.

Entered at the Chicago Post-Office as Second-Class Matter.

OFFICE, 169–175 LA SALLE STREET.

No. 57. Vol. II.—31. CHICAGO, SEPTEMBER 27, 1888. Two Dollars per Year. Single Copies, 10 cts.

CONTENTS:

THE PSYCHIC LIFE OF MICRO-ORGANISMS. The Quest and Capture of Foods. A. Binet. Part VI. Translated from the *Revue Philosophique* by μκρκ..... 1223

BODY AND MIND; OR, THE DATA OF MORAL PHYSIOLOGY. Soil and Climate. (Continued.) Felix L. Oswald, M. D. Part XV..... 1227

ON THE LIFE AND LETTERS OF CHARLES DARWIN. A Paper read before the Literary and Philosophical Society of Liverpool, during the session of 1887–88. By The Rev. H. H. Higgins..... 1231

THE ETHICS OF LITERARY DISCUSSION. Editor. 1230

RICARDO ANTONIO PROCTOR VIRO PRÆDITO VIRTUTE MNEMOSYNON. M. C. O'Byrne..... 1232

BOOK REVIEWS..... 1233

FICTION.

The Lost Manuscript. (*Continued.*) Gustav Freytag. 1233

WANTED!

An energetic and educated person wanted in every town, city and district, to canvass for subscriptions to The Open Court; liberal compensation. Address, with references,

OPEN COURT PUBLISHING COMPANY,

Box F., Chicago, Illinois.

A BIOLOGICAL MONTHLY.

The "AMERICAN MICROSCOPICAL JOURNAL" is the cheapest periodical in the United States devoted to this branch of science. No biologist should do without it. Price, $1.00 per year; 12 cents per copy.

CHAS. W. SMILEY, Publisher,

Box 630, WASHINGTON, D. C.

LECTURING.

Mr. Geo. Willis Cooke will lecture during the season of 1888–89, as usual. He is prepared to give four lectures on *The Intellectual Development of Women*, and three on *The Poetry of Robert Browning*. He also has lectures on George Eliot, Charles Darwin, Robert Browning, and Emerson. During the past summer he has prepared a new course of four lectures on *The Social History of New England*, in which he will describe the town meeting, the meeting-house, the Puritan minister, and the home life of our forefathers, with the aim of showing how the people actually lived and how American Ideas were gradually developed. Mr. Cooke's address is Dedham, Mass.

SHELLS, MINERALS & FOSSILS

—Also—

SEEDS and PLANTS.

C. R. ORCUTT, Publisher,

The West American Scientist,

SAN DIEGO, CALIFORNIA.

Three Introductory Lectures

—on—

The Science of Thought.

(First published in The Open Court of June, July, and August, 1887.)

BY F. MAX MÜLLER.

1. The Simplicity of Language;
2. The Identity of Language and Thought; and
3. The Simplicity of Thought.

With an Appendix which contains a Correspondence on "Thought without Words," between F. Max Müller and Francis Galton, the Duke of Argyll, George J. Romanes and Others.

THE OPEN COURT PUBLISHING CO.

169-175 La Salle Street. Chicago.

Neatly Bound in Cloth. Price, 75 Cts.

PRESS NOTICES.

"Full of novel thought."—*Chicago Herald.*

"The subject is discussed with great clearness and simplicity."—*Book Chat.*

"No other writer concentrates so much in such simple language."—*Baltimore Sunday News.*

"The absurdity of the theory is manifest."—*New York Science.*

"The lectures are in their way interesting, even to those who disagree with the author's views."—*The Critic.*

"Max Müller's supremely simple theory is hotly disputed, — — but it is easily vindicated, provided one is not a dualist on principle."—*Boston Beacon.*

"The lecturer states his position with great clearness and cogency and comes out of the correspondence with his critics with credit and with his reasoning unshaken."—*Chicago Times.*

"The lectures are able presentations of certain views in mental philosophy by one who is a recognized authority upon that subject, and will be read with interest by students and scholars."—*Cincinnati Times Star.*

"The world-wide reputation of its author, as the greatest living authority on philological subjects, is enough to command the careful perusal and respectful consideration of all who may take up this little book."—*Chicago Legal Advertiser*

THE LEADING ORGAN

of British Thought on the American Continent.

"THE WEEK,"

A Canadian Journal of Politics, Society, and Literature.

Published every Thursday. $3.00 per annum.

"THE WEEK," Canada's Literary Journal, which has entered its fifth year, appeals by its comprehensive table of contents to the different tastes which exist within the circle of a cultured home, and will endeavor faithfully to reflect and summarize the intellectual, social, and political movements of the day.

In politics "THE WEEK" is thoroughly independent. It is untrammeled by party connections, free from party leanings, unbiased by party considerations, its desire being to further, to the utmost of its power, the free and healthy development of the Nation.

C. BLACKETT ROBINSON, Publisher,
5 Jordan Street,
Toronto, Canada.

☞ *Sample Copies Sent Free on Application.*

TO ADVERTISERS.—"THE WEEK" affords an excellent medium for advertisements intended to reach the professional and cultured classes of Canada. It is read by people who can purchase what they want and pay for what they purchase. None but the choicest business announcements will be taken. All advertisements will be set up in such style as to insure "THE WEEK'S" high typographical appearance, and enhance the value of the advertising in its column. For rates, etc., apply to

T. R. CLOUGHER, Business Manager,
TORONTO, ONT.,
or J. WALTER THOMPSON, (Times Building),
NEW YORK.

AGENTS wanted for religious and economic books. 10c. Charles H. Kerr & Co., Publishers, Chicago.

THE OPEN COURT.

PUBLISHED EVERY THURSDAY BY

THE OPEN COURT PUBLISHING CO.

EDWARD C. HEGELER, PRESIDENT. DR. PAUL CARUS, EDITOR.

THE OPEN COURT is a radical journal which holds that Religion and Science, rightly understood, do not contradict each other. The apparent divergencies have arisen from the false dualistic conceptions of world and life; and the Conciliation of Religion with Science is to be found in *Monism*—to present and defend which is the main object of THE OPEN COURT.

Monism is that view which recognizes the Oneness of All-Existence.

As a Philosophy, *Monism* is the basis of modern science. It teaches that truth is one and the same. One truth can not contradict another truth. Cognition must agree with facts and be free from self-contradiction, constituting a clear and systematic conception of Reality.

As a Religion, *Monism* teaches that the individual is a part of the whole. The individual must conform to the laws of the All in order not only to live, but also to lead a moral life—a life that is worth living.

The religion of *Monism* thus becomes the scientific basis of Ethics which regulates the relations of the individual to his fellow-beings as well as to the cosmical laws of the All.

Translations from the most prominent authors of Europe have been procured, and efforts are made to present the very best and most advanced thought bearing on scientific, religious, social, and economic questions.

RATES OF ADVERTISING.

For Each Insertion, without choice of position, per line	$ .10
" " " " " " per column	12.00
" " " " " " per page	20.00

Agate measure, 14 lines to the inch, 126 lines to the column.

For specified position, 20 per cent. will be added to regular rates.

THE OPEN COURT sent free to advertisers while their advertisements continue.

TO ADVERTISERS.—THE OPEN COURT will be found to offer especial advantages for the advertisement of Current Literature and the insertion of Publishers' notices. Its numbers being on file in all the prominent hotels, libraries and public institutions in the United States and Canada, and reaching the professional and scientific circles of every State in the Union. Only bona fide advertisements will be accepted.

Throughout the Postal Union:

TERMS, $2.00 PER YEAR. $1.00 FOR SIX MONTHS. $0.50 FOR THREE MONTHS. SINGLE COPIES, 10 CTS.

All communications should be addressed to

THE OPEN COURT,

(Nixon Building, 175 La Salle Street,)

P. O. DRAWER F. CHICAGO, ILL.

FORMER CONTRIBUTIONS TO "THE OPEN COURT."

PROF. E. D. COPE.

In Number 23 Professor E. D. Cope treats of "Evolution and Idealism," and finds in the evidence of evolution the refutation of the doctrine of idealism. He concedes that much of what we consider the objective world is unreal and has no existence, except, as we perceive it, like the snakes, for instance, to the victim of *delirium tremens;* and he agrees that "the properties of matter" owe much of their character, and even their existence, to our senses, which give matter all its qualities, or, at least, modify and change them according to the number of our senses and their ability to perceive. Yet, for all that, he says: "If a given supposed object be purely a mental state on the part of the subject, a rational cause for the production of that state is wanting."

With great self-confidence, Professor Cope says: "Evolution gives the *coup de grace* to idealism of the consistent type. In the gradual unfolding of organic life it sees the two universal facts, subject and object. It sees them interact and influence each other," and further on he says: "It is equally competent for the materialist to deny the existence of mind as for the idealist to deny the existence of matter. The materialist beholding the imperfection of the senses may pronounce them to be, one by one, incompetent witnesses, and declare them to be illusions. But the fact is, both exist, object and subject, matter and mind."

MONCURE D. CONWAY, on Agnosticism, in No. 47.

Mr. Moncure D. Conway, in reference to the philosophical exposure of Agnosticism in the editorial article of Nos. 43 and 44 of THE OPEN COURT, declares that the Unknowable cannot in the least concern the religious nature. Only weariness of wing can have brought free thinkers to seek rest on this raft. Religion does not follow abstract and vague gods, it follows Jesus, Buddha, Mary, who may be known and loved. On the truth and moral value of these great figures, man can base his life. Mr. Conway concludes with the remark that the ethical side of monism has not as yet been made clear. Nature seems predatory and cruelly impartial between good and evil. Adherents of error survive more comfortably and increase more extensively than the disciples of truth. May it not be more truly said that there is a moral law in man to which nature must conform in order to be elevated and transfigured to a nobler existence? Mr. Conway's critical remark if it were unanswerable from the standpoint of Monism would drive religion and philosophy back into the dualism and supernaturalism of former times. And truly the supernatural, if it is justifiable at all, must be recognized in the moral nature of man, unless man is proven to be a part of nature The editor's answer to Mr. Conway's criticism, in the same number, expatiates on the Oneness of Man and Nature, thus showing that humanity, culture and civilization are but a higher stage of the natural, and that morality does not stand in contradiction to, but is an observing of and a conforming to the cosmical order of the All.

GEORG VON GIZYCKI.

In Nos. 25 and 26 is presented a very scientific article entitled "Determinism versus Indeterminism," by Georg Von Gizycki, Professor of Philosophy at the University of Berlin. This is in answer to Professor William James of Harvard University, who, in a lecture published in the *Unitarian Review*, had maintained the doctrine of *indeterminism*. The whole inquiry relates to the Freedom of the Will, and the terms are thus explained:

"The question whether the actions of the will are phenomena which act in conformity to a law, admits of only two answers—*yes* and *no*.

The philosophic theory which holds that they do, has been called *Determinism;* that which says they do not is known as *Indeterminism*."

The argument, which is deeply philosophical throughout, and in some parts of it a demonstration, proceeds upon the theory that the human will is under the control of law, and that its actions are *determined* by necessity; that Freedom of the Will is never an accident, nor the offspring of caprice; that the reformation of an evil-doer is made by surrounding him with conditions whose laws will compel his will to act in the right way.

C. K. WHIPPLE.

"Progressive Orthodoxy," by C. K. Whipple, in No. 25, is a very keen and rather sarcastic censure on "The American Board of Commissioners for Foreign Missions." The said "Board" declined to comply with the request of their missionaries to make a few changes in the plan of saving the savages. These innocents, it was experienced, object in an absurd benevolence to the plan of eternal damnation, so as to be lost for Christianity. Mr. Whipple, it seems, did not consider that the Board could not have acted otherwise, for it would have been an outright confession that the savages had converted the missionaries, a most illogical and very improper thing to do.

The Open Court.

A WEEKLY JOURNAL

Devoted to the Work of Conciliating Religion with Science.

No. 57. (Vol. II.—31.) CHICAGO, SEPTEMBER 27, 1888. Two Dollars per Year. Single Copies, 10 cts.

THE PSYCHIC LIFE OF MICRO-ORGANISMS.*

BY A. BINET.

Translated from the "Revue Philosophique" by μκρκ.

PART VI.

III.

THE QUEST AND CAPTURE OF FOODS.

Concerning the prehension of foods and the search for nutriment on the part of Ciliates, we can do no better than to quote entire a note which M. E. Maupas has been pleased to send us upon the subject. We had put to him two questions: *First*, do the Ciliates hunt their food? *Second*, while in quest of live prey, do the Ciliates called hunters make an actual hunt, involving the espial of prey from a distance and the voluntary pursuit of the same in the circuitous paths they follow? M. E. Maupas after having once more had recourse to observation, briefly recapitulates his opinion in the following lines:

"From the standpoint of prehension of food, the Ciliates may be divided into two great groups:

1. Ciliates with alimentary vortices;
2. Hunter Ciliates.

"In the first group the mouth is always held wide open, and along with the nutritive particles which the current of the vortex keeps constantly sucking in, we may at will cause other, absolutely inert and indigestible, particles to take the same course; for instance, such substances as granules of carmine, indigo, and rice-starch. These granules, totally unfit for nutritive purposes, pass through the body of the Ciliates along with the genuine nutriment and are finally cast out intact with the excrement. I think, therefore, we may affirm that the species having alimentary vortices exercise no real choice in selecting their foods, and that they absorb indiscriminately all corpuscules which by reason of their form and density admit of being seized and drawn into the alimentary whirlpool.

"In the case of the hunter Ciliates proper, the mouth is constantly closed. The act of absorbing each object captured is accomplished by a process of deglutition comparable in every phase to the like process in higher animals. Furthermore, these species feed only upon living prey, which they capture and entrammel by means of their trichocysts (*vid. Archives de Zoologie*, Vol. I. 1883, p. 607 and ff.). By this very act they exercise a choice in the selection of food. But this manifestation of choice is not, in my opinion, the result of preference, or of individual taste, but is the consequence of the peculiar construction of their buccal apparatus, which does not enable them to take other and different nourishment.

"These hunter Infusoria are constantly running about in quest of prey; but this constant pursuit is not directed towards one object any more than another. They move rapidly hither and thither, changing their direction every moment, with the part of the body bearing the battery of trichocysts held in advance. When chance has brought them in contact with a victim, they let fly their darts and crush it; at this point of the action they go through certain manœuvres that are prompted by a guiding will. It very seldom happens that the shattered victim remains motionless after direct collision with the mouth of its assailant. The hunter, accordingly, slowly makes his way about the scene of action, turning both right and left in search of his lifeless prey. This search lasts a minute at the most, after which, if not successful in finding his victim, he starts off once more to the chase and resumes his irregular and roving course. These hunters have, in my opinion, no sensory organ whereby they are enabled to determine the presence of prey at a distance; it is only by unceasing and untiring peregrinations both day and night, that they succeed in providing themselves with sustenance. When prey abounds, the collisions are frequent, their quest profitable, and sustenance easy; when scarce, the encounters are correspondingly less frequent, the animal fasts and keeps his Lent. The *Lagynus crassicolis*, accordingly, never sees its victim from a distance and in no case directs its movements more towards one object of prey than towards another. It roams about at random, now to the right and now to the left, impelled merely by its predatory instinct—an instinct developed by its peculiar organic construction, which dooms it to this incessant vagrancy to satisfy the requirements of alimentation.

"The vorticel Infusoria, when in a medium abounding in food, are almost entirely sedentary in their habits, only making slight changes of position. But if they are placed in a medium affording but little nutritive material, they become as migratory as the hunt-

*Translation copyrighted.

ers, and are seen to race about in all directions searching for more abundant nutriment. It is hard to find a more perfect illustration of the influence exerted by the conditions of a medium upon the habits and customs of animals.

"The *Leucophrys patula* is a type distinctively carnivorous and possessed of an extremely voracious appetite, a fact which explains its power of multiplication, one of the greatest I have studied. With a temperature of 25° in my laboratory I have recently seen it separate by fission seven times in twenty-four hours, that is to say, a single individual produces from itself just one hundred and twenty eight others in that time. In constant pursuit of its prey, it seizes its victims by the two stout vibratile lips with which its mouth is armed, and swallows them alive and whole. The victims may be seen struggling and tossing about for a time in the interior of the Leucophrys's body and afterwards to expire slowly under the action of the digestive juices of the vacuole in which they have been enclosed. Placed in a medium well-stocked with small Ciliates, the Leucophrys have their bodies constantly crammed with victims swallowed in the manner above described. Like the other hunter Ciliates the Leucophrys does not espy its victims from a distance and does not guide itself towards them. It simply darts about from right to left, every moment changing its direction. It thus increases its chances of coming in collision with its prey and every time that one of its unfortunate victims falls in contact with its vibratile lips, it is seized, irresistibly drawn towards the mouth and swallowed within less than a tenth of a minute."

Certain hunter Infusoria have methods of pursuit and capture which deserve to be examined separately. Claparède and Lachman in their excellent work upon Infusoria and Rhizopods, have minutely described the manner in which a large Infusory, the *Amphileptus Meleagris*, attacks the *Epistylis plicatilis*. The *Epistylis* are colonizing vorticels of which certain individual members attain a size of not less than 0·21 mm. The *Epistylis* form aborescent groups, the ramifications of which are quite regularly dichotomous. These ramifications all grow at exactly the same rate and the individual branches all rise to the same height, representing what is called, in botany, a corymbous inflorescence. "We were observing one day," says Claparède, "in the hope of seeing what would come of the manœuvre, an *Amphileptus*, which was slowly creeping upon a colony of *Epistylis*. The way in which it approached the Vorticels, feeling them, so to speak, and partly enclosing them in its pliable body, already seemed suspicious. At last, it made a direct attack upon one of them by fastening itself upon the upper part of its body. It opened its huge mouth, which is never to be seen except when the animal is eating, and slipped over the *Epistylis* like the finger of a glove being drawn upon a finger of the hand. We saw the sides of the buccal aperture (which are capable of being dilated in a truly astonishing manner) slip slowly over the peristome and upon the body of its prey, and then draw together about the point where it was made fast to the pedicle. The cilia covering the body of the *Amphileptus* began to shake with that peculiar motion which is always noticed when a ciliated Infusory secretes a cyst. At the expiration of a moment or so, a fine line was seen to appear around the whole body which continued to spread so as soon to form the cyst." (This might be called a cyst of digestion.) "The phenomenon as a whole is quite simple. An *Amphileptus* approaches an *Epistylis*, devours it and encysts itself upon the spot, the victim being still attached to its pedicle. It then endeavors to wrench the *Epistylis* from its point of attachment by twisting; it turns on its axis from left to right and then from right to left, successively; when it has succeeded, it continues its work of digestion, and occasionally divides in two within the cyst itself. During the last stage of digestion, it rests for a while, when it commences again to turn about in the cyst, evidently seeking to disengage itself. At the close of a certain number of hours, the cyst breaks. The *Amphileptus* issues forth and starts in quest of another victim."*

The hunter Infusoria are frequently armed with *trichocysts*. Trichocysts are urtical filaments which serve the animalcula provided with them to disable or wound other micro-organisms.

A large unmber of Infusoria, the *Paramecia*, the *Ophryoglenæ*, etc., use their trichocysts as organs of defense. With other species, of which we shall speak more at length, the trichocysts are organs of offense. They are located either in the sides of the mouth or in parts adjacent thereto; this is the case with the Lacrymaria, the *Didinium*, the *Enchelys*, the *Lagynus*, the *Loxophyllum*, and the *Amphileptus*.

These latter animalcula attack the live prey that constitutes their food, in the following manner. They dash upon their victim and bury the trichocysts with which they are armed, into its body. The victim is immediately brought to a halt, whereupon the hunter seizes it and swallows it. So, when the *Lagynus Elongatus* intends to seize a victim that has fallen into its vortex and has thus been drawn into the neighborhood of its mouth, it throws itself swiftly forward. At the moment of contact the hunted Infusory becomes suddenly paralyzed and remains perfectly motionless. This paralysis is evidently caused by the trichocysts which line the æsophagus of the Lagynus and with

* *Etudes sur les Infusoires et les Rhizopodes*, Vol. II. p. 166, 1861.

which the latter has transpierced its prey at the moment it came in contact by its anterior extremity.*

In a higher stage of organization, the Microzoön possessing a mouth changes its position in order to intercept its prey, and give it chase.

The *Didinium Nasutum* (Stein), a carnivorous Infusory and one of the most voracious of our fresh stagnant waters, operates in a more complicated manner: it casts its trichocysts upon its victim from a distance. The importance of this instance induces us to stop here a moment.

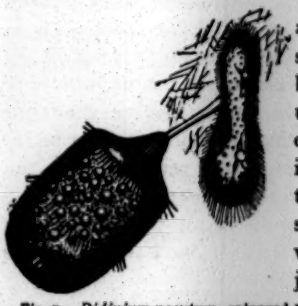

Fig. 7.—Didinium nasutum, enlarged two hundred diameters. The figure represents a *Didinium* overpowering a *Paramœcium aurelia*. The nettle-like filaments discharged by the *Didinium* are seen on all sides of the *Paramœcium*; while the latter, already seized by the tongue-shaped organ of the *Didinium*, is being gradually drawn towards the buccal orifice (after Balbiani).

The *Didinium* (fig. 7), as regards the general shape of the body, may be compared to a diminutive cask, rounded off at one of the ends and terminated at the opposite extremity by an almost level surface from the midst of which rises a conical projection quite strongly marked. This projection is an organ of deglutition (swallowing); a longitudinal striation is noticed here formed of minute solid rods, of extreme tenuity and independent of the sides. These organs are the weapons used by the *Didinium* in attacking the live prey which constitutes its sole nourishment.

Not only does it attack and devour animalcula almost as large as itself, but frequently it even seizes individuals of its own kind. In such cases it is always Infusoria, and never the Rotatoria, although the latter often abound in waters which the *Didinium* inhabits. It appears, moreover, to have a marked predilection for certain species; and so it happens that the huge and inoffensive *Paramœcium aurelia* is almost always its choice by preference among the animalcula that inhabit the same liquid.†

The prehension of food by the *Didinium* exhibits interesting aspects, which have not as yet been observed in any other Infusory. M. Balbiani, in his first observations, had often been surprised at seeing animalcula that the Didinium had passed by without touching, suddenly stop as if violently paralyzed; whereupon our carnivorous specimen straightway approached and seized them with seeming facility. More careful examination of the Didinium's actions soon furnished the key to this enigma. If, while swiftly turning in the water, the *Didinium* happens into the neighborhood of an animalculum, say a Paramecium, which it is going to capture, it begins by casting at it a quantity of bacillary corpuscules which constitute its pharyngeal armature. The Parmecium immediately stops swimming, and shows no other sign of vitality than feebly to beat the water with its vibratile cilia; on every side of it the darts lie scattered that were used to strike it. Its enemy then approaches and quickly thrusts forth from its mouth an organ shaped like a tongue, relatively long and resembling a transparent cylindrical rod; the free, extended extremity of this rod it fastens upon some part of the Paramecium's body. The latter is then gradually brought near by the recession of this tongue-shaped organ towards the buccal aperture of the Didinium, which opens wide, assuming the shape of a vast funnel in which the prey is swallowed up.*

Up to this point we have paid little attention to movements of defence and of flight. Upon this subject a few words will suffice. When vorticels are alarmed, they are seen to contract forcibly their pedicle, which in a state of rest stays extended. Infusoria placed in a preparation where they are at their ease, swim quietly about; if any sharp excitation disturb them, they accelerate their pace; those armed with a rigid bristle at the posterior extremity, rush precipitately onward whenever another Infusory chances to touch that tactile appendage. The unaggressive Parmecia, when attacked, endeavor to escape, but are also able to defend themselves by means of the trichocysts with which their ectosarc is armed.

IV.

Unicellular organisms do not all live in a detached state; a large number of species are found grouped together in colonies; the initial basis of these agglomerations is always a mother cell, the offspring of which instead of dispersing to live at large, remain agglutinated to one another. Ehrenberg had believed that in certain species (especially in the case of the *Anthophysa vegetans*, an aggregation of minute monads growing as a sort of bush) the colony was created by the union of minute organisms that originally lived at large; but observation has shown that his theory was incorrect. It may be laid down as a general rule that every colony of monocellular animals or vegetables spring from the divisions of a single cellule. The cellules of one and the same colony, therefore, are always sister cellules, and the colony represents a family in miniature.

A leading instance of a colony wholly temporary, is found in those organisms the cuticle of which does not take part in the phenomena attending the division

* Maupas, op. cit., p. 495.

† The *Didinium*, Balbiani tells us, never attacks the *Parmacium bursaria*, which is distinguishable from the *P. aurelia* by its green coloration.

* *Archives de zoologie expérimentale*, 1873, Vol. II. p. 363. *Observations sur le Didinium nasutum*, by E. G. Balbiani.

of the protoplasm. In this case, the protoplasm beneath the envelope alone divides; the segments resulting therefrom are often numerous, and it is not until the plasma has finished dividing that the maternal cuticle is destroyed and that the segments separate to live abroad in a detached state. Up to that time they remain bound together.

It is thus seen that the existence of this minute colony is a transient phenomenon, which lasts only during the time necessary for the division of the maternal body. These phenomena have been noticed among many of the Flagellates. What appears surprising is, that the maternal cellule, although continuing to divide beneath the envelope, keeps on moving about in the water by means of its own flagellum as if still constituting only a single animal. The reason of this is that one of the segments into which the plasm is divided and which is situated in the anterior part of the mother-cellule, remains connected with the flagellum and takes charge of its movements. This segment (like an individual distinct in itself) alone guides the bark that carries its sisters. And so, although this diminutive colony is as a rule but short-lived, a division of labor has been effected among its members; the anterior segment is alone entrusted with the office of locomotion.

The colony has a duration less ephemeral in the case of the *Gonium pectorale*, a Volvocine known in our fresh waters. It is formed by the aggregation of sixteen individuals which remain detached but adhere laterally to one another. The colony is developed in one way only: it is in the form of a minute rectangular plate of a beautiful green color. In the case of the *Pandorina*, the colony assumes the form of a minute sphere; it is composed of sixteen, or as many as thirty-two individuals, joined together beneath a stout envelope; each member remains free in action, and projects its two flagella through the cuticle. With the *Eudoryna elegans*, the colony is modeled upon nearly the same plan excepting that it is composed of thirty-two individuals and that the latter, placed beneath the same cuticle at equal distances apart, do not touch one another.

In the genus Volvox, colonies are found of which the structure is very complicated. Such are the great green balls formed by the aggregation of diminutive organisms, which form the surface of the sphere, and are joined together by their envelopes; they have each two flagella, which pass through the enclosing membrane and swing unimpeded on the outside; the envelopes, each tightly holding the other, form hexagonal figures exactly like the cells of a honeycomb. Each Volvox is at liberty within its own envelope; but it projects protoplasmic extensions which pass through its cuticle and place it in communication with its neighbor. It is probable that these protoplasmic filaments act like so many telegraphic threads to establish a network of communication among all the individuals of the same colony; it is necessary, in fact, that these diminutive organisms be in communication with each other in order that their flagella may move in unison and that the entire colony may act as a unit and in obedience to a single impulse. The number of micro-organisms constituting a Volvox colony is quite considerable: as many as 12,000 have been counted.

It was upon analogous phenomena that Gruber based the existence of a diffused nervous system in the Stentors. The same line of reasoning may be followed in the case of the Volvox. Since unanimity of movement is demonstrable among twelve thousand micro-organisms constituting a colony, it must be inferred that their movements are regulated by the action of a diffused nervous system present in the protoplasm. This conclusion is all the more interesting from the fact that these Volvox are vegetable micro-organisms.

In the dicœcian Volvox, the female cellules and the male cellules are joined together by themselves in separate colonies. When the time of fecundation arrives, the male cellules or antherozoids scatter and proceed to conjugate with the female cellules. The colony which bears the female cellules also contains neutral cellules which are not designed for fecundation; the latter simply perform a locomotive function; equipped with one eye and two flagella, they are intended to move the great colonial ball: they are the oarsmen of the colony. The Volvox, male, female, and neutral, all seek the light, whether solar or artificial, and settle near the surface of the water. As soon as the female colonies have been fecundated, the oöspores change their color: they turn from green to an orange yellow. At this point, the colony is seen to draw away from the light and to disappear from the surface of the water. This change of position is effected by means of the vibratile cilia with which each neutral cell is furnished and which project beyond the gelatinous sphere; now, as no change of color or form is noticed in the neutral cells after fecundation, it may be asked from what cause they flee from the light which they formerly sought.

Colonies of Proto-organisms formed by the division of a mother cell of which the segments remain united, are not entirely without analogy with a pluricellular organism which likewise springs from a single cell called the egg, and the resultant divisions of which do not separate.

The colony constitutes in a way a first step towards the physiological constitution of a pluricellular organism; it serves to fix a stage of transition in the animal

kingdom, between Protozoa and Metazoa. A fact which strengthens this analogy is, that certain colonies, as the *Synura uvella* and the *Uroglena volvox*, can divide into two other colonies; strangulation acts upon the mass just as if upon a pluricellular organism. This curious observation was made by Stein and Bütschli.

Nevertheless, an essential difference still separates the Metazoa and the Protozoan colonies, even when in these colonies a division of function has been established among several individual groups. The physiological differentiation brought about in these Protozoan colonies is the result of a mechanism which differs in every respect from that by which it is effected in the case of the Metazoans. In the latter instance the differentiation results from the division of the embryo into *germinative folia* each of which is the origin of a separate group of organs. At a certain stage of development, the superposition of these folia gives rise to the formation of a *gastrula;* the *gastrula* is formed by two folia joined together, representing a pouch open to the outside; it is characteristic of Metazoans, the Protozoan never reaching this stage. Certain colonies observed by Hæckel, the *Magosphæra planula* for example, and the volvox, of which we have before spoken, appear in the form of a sphere; they suggest an anterior stage of development to which the name of *morula* or of *blastula* has been given; but they do not get beyond this stage.

We have now considered assemblages of organisms which live joined together like the Gonium and sometimes united by a material band like the Volvox, where the individuals are grouped together under one and the same cuticle. Voluntary and free combinations are much more rarely met with; nevertheless cases occur. There exist organisms which lead a life of habitual isolation but which understand how to unite for the purpose of attacking prey at the desired time, thus profiting by the superiority which numbers give.

The *Bodo caudatus* is a voracious Flagellate possessed of extraordinary audacity; it combines in troops to attack animalcula one hundred times as large as itself, as the Colpods for instance, which are veritable giants when placed alongside of the *Bodo*. Like a horse attacked by a pack of wolves, the Colpod is soon rendered powerless; twenty, thirty, forty *Bodos* throw themselves upon him, eviscerate and devour him completely (Stein).

All these facts are of primary importance and interest, but it is plain that their interpretation presents difficulties. It may be asked whether the Bodos combine designedly in groups of ten or twenty, understanding that they are more powerful when united than when divided. But it is more probable that voluntary combinations for purposes of attack do not take place among these organisms; that would be to grant them a high mental capacity. We may more readily admit that the meeting of a number of Bodos happens by chance; when one of them begins an attack upon a Colpod, the other animalcula lurking in the vicinity dash into the combat to profit by a favorable opportunity.

(To be continued.)

BODY AND MIND; OR, THE DATA OF MORAL PHYSIOLOGY.*

BY FELIX L. OSWALD, M.D.

Part XV.

SOIL AND CLIMATE. (Continued.)

During the golden age of the Mediterranean republics the borderland of the temperate zone and the tropics seemed to unite all the conditions of a superior civilization. For nearly a thousand years Greece, Italy, Asia Minor, Syria, and northern Africa were studded with flourishing cities, while the natives of the higher latitudes had hardly advanced beyond a stage of utter barbarism. The "towns" of pagan Germany were mere fortified camps; the vast region of alluvial plains between the Vistula and the lower Rhine was covered with almost continuous forests, when Mauritania (the modern Morocco) could boast famous seats of learning and Alexandria contained the largest library of the Mediterranean coast-lands.

Time has completely reversed that order. Africa and Asia Minor have relapsed into savagery and nomadism, while northern Germany is a hive of industrial enterprise. Scotland the "home of the frozen Picts," is tilled like a garden, while the "promised land" is covered with desert thorns. Those undeniable facts have tempted several Christian apologists to deny the moral influence of climate and ascribe the blessings of civilization to metaphysical (religious) rather than natural agencies. "Civilization," says Chateaubriand, "has followed the apostles of the cross from the Nile to the banks of the Seine. When St. Augustine ruled the bishopric of Hippo, Africa was Eden and Gaul a wilderness. Now the crescent reigns over a moral and physical desert, while the genius of Christian ethics has made the North the home of culture and happiness. The religion of love has effectually changed the social condition of this planet."

The main key to the enigma of that change can, however, be found in the circumstance that the civilization of a healthy wilderness is a far easier task than the redemption of an exhausted soil. Twenty years after the followers of Daniel Boone entered the "dark and bloody ground" of the Kentucky woodlands those woods resounded with the hum of traffic and the music of school-bells. Twenty centuries of irrigation and tillage would hardly suffice to restore the promised land to its former state of productiveness. One by

* Copyrighted.

one the nations of the Mediterranean paradise were overtaken by the marasmus of decrepitude—a disease for which the resources of science seem to offer no remedy. The wild hunters of the north were for ages contented with the freedom of their native woods, but long before their succession to the political supremacy of this planet they were *potentially* the superiors of their cultured neighbors. Cyrus the Great, who defeated his southern rivals almost as easily as the Macedonian invaders afterwards defeated his successors, had to pay his mistake with his life when he undertook to meddle with the savage tribes of the Massagetæ—probably the ancestors of the Ostrogoths. Darius Hystaspes, with all his western auxiliaries, barely escaped a similar fate on his campaign against the independent Scythians. Four centuries before the beginning of our chronological era two tribes of savage Gauls cut their way through northern Italy, routed the Umbrians, routed the Etruscans, routed the armies of republican Rome, entered Rome itself, and retreated only upon payment of an enormous bribe. A hundred years after, i. e., during the very zenith-period of Grecian civilization, a second swarm crossed the borders of Macedonia, fought their way across the Hellespont and conquered large portions of Syria and Asia Minor. Neither discipline nor superior arms could avert the fate of Rome when the Visigoths crossed the Danube *en masse*. A rare conjunction of favorable circumstances enabled the Saracens to accomplish the conquest of Spain before the subjects of the Gothic monarch had recovered from their first surprise; but already a century after the battle of Xeres de la Frontera we find Gothic chieftains bearding the Moors in their southern strongholds. Fernan Gonzales (born A. D. 887) reconquered Burgos and Salamanca. Fernando III., captured Cordova and expelled the Moors from Seville after the prestige of their power had already received a fatal check on the battlefield of Tours, where the iron fists of the Northland warriors prevailed against the superior tactics and fanatical valor of their opponents.

For the next thousand years the history of Europe records, indeed, an almost uninterrupted series of victories of northern nations over their southern neighbors. "Civilization," during that age of iron and blood, changed hands almost as readily as political power. The seeds of culture sprouted in the soil of the higher latitudes, the victors inherited the arts, the science, and the industries, as well as the wealth of the vanquished; and the usual concomitants of defeat, servility and indolence, completed the degradation of the fallen races. Now and then the fortune of war alone has forever decided the fate of a valiant nation by the actual extirpation of all its able men, as in the battle of Vercellæ where the entire force of the Cimbri was not only routed, but slain, by the legions of Marius, or on the plateau of Gunib, where the Russians annihilated the most warlike tribe of the Circassian highlanders. As a rule, though, degeneration precedes such defeats, or makes their consequences more fatal. The disastrous folly of the Crusades cost the nations of Christendom more than a million lives, representing the very flower of their chivalry; yet the homes of the slain heroes still nourished the roots of valor, and a few years of peace healed the wounds of war, as spring heals the havoc of winter. But spring and summer return in vain where the soil itself has lost its reproductive force, and worn-out Syria will perhaps never recover from the storm of conquest that has swept her plains like the blast of the blighting simoom; on the barren hills of Greece the sunshine of a hundred peaceful years would not revive the buried age of the Olympic festivals; and the civil wars of Spain have probably sealed the fate of an exhausted nation. The flowers of civilization have the earliest faded where they developed their earliest buds. Instead of arresting that decay, the delusions of supernaturalism have unquestionably accelerated its progress. The world-renouncing fanaticism of the early Church contributed more to the ruin of the Roman Empire than world-conquering ambition of the Gothic warriors. "That Church," says Lecky, "consisted of men who regarded the Roman government as a manifestation of Antichrist, and who looked forward with passionate longing to its destruction. It did its utmost to substitute a new enthusiasm for that patriotism which was the very life-blood of the national existence. Many of the Christians deemed it wrong to fight for their country. All of them aspired to a type of character and were actuated by hopes and motives wholly inconsistent with that proud martial ardor by which the triumphs of Rome had been won, and by which alone her impending ruin could be averted." (*History of Morals*, Vol. I. p. 413.)

"Not to the division of the Empire Rome owed her downfall," says Heine, "but on the Tiber as on the Bosporus her strength was consumed by the poison of dogmas, and here, as there, Roman history became the chronicle of a wasting disease, of an agony prolonged for centuries of hopeless decline. Does it not seem as if outraged Asia had avenged her wrongs by the fatal gift of that creed—as fatal to the victor as the shirt which the dying Centaur poisoned with his own blood to avenge his death at the hands of a resistless conqueror? Rome, the Hercules of Nations, was consumed by the virulence of that poison till helmet and shield dropped from the nerveless body and the voice of battle-shouting heroes died down to the whimper of praying priests. . . . . The dogmas of that creed spread with the rapidity of a pandemic plague;

throughout the Middle Ages the fever raged in paroxysms of fitful fury, and the tremor of exhaustion still weakens the nerves of the present generation." (History of Religion and Philosopy, p. 11.)

"The monody of Libanius* was the dirge of pagan civilization. As soon as the light of philosophy had faded, the vampires of superstition became aggressive, and for the next thousand years the moral history of Europe is the history of an unremitting war against Nature, a war which systematically promoted the survival of the unfit by making common sense a stigma and free inquiry a capital crime. . . . . Between the morning-light of pagan philosophy and the evening-light of modern science intervened a thousand years' eclipse of human reason, a millennium of madness and misery which, but for that unnatural night, might have been the happiest period in the history of mankind. The rule of superstition robbed the Germanic nations of the spring-time of their national development. When they awakened from the morning-slumber of their political infancy they found themselves in the coils of a strangling serpent, and the prime of their strength, which might have won them the golden prizes of the international arena, had to be wasted in the struggle against the monster that threatened to crush out their reason and their life. In that struggle for life and light, the Hercules of the North finally prevailed, but the Apollo of the South succumbed to the Python; the Mediterranean paradise was forever lost." (Secret of the East, p. 63.)

"The refuge of the convents," says Blanqui, "was doubtless a welcome retreat to the oppressed, but the human race never suffered a more cruel outrage, industry never received a wound better calculated to plunge the world back into the darkness of the rudest antiquity. It suffices to say that the prediction of the approaching end of the world,—a rumor industriously spread by the rapacious monks of that time, was received without terror." (*Résumé de l'Histoire du Commerce*, p. 156.)

The sophism of Chateaubriand can therefore be reduced to the fact that the age of superstition, though it greatly retarded, did not altogether prevent the civilization of the northern nations, and that nature at last prevailed in the struggle between the normal influence of climate and the abnormal influence of a far-spread moral epidemic.

Vice, *per se*, cannot adequately account for the degeneration of southern nations, though as a collateral explanation, it may be accepted in connection with the circumstance that *in the south the besetting foibles of mankind can be indulged with less impunity than in the climate of the colder latitudes.* Frost is an antiseptic. The yearly experience of our southern states demonstrates the truth that malarial diseases can develop their epidemic forms only during the warmer seasons, and that even in midsummer they rarely spread beyond a certain degree of altitude or latitude. The first frost generally puts a stop to the ravages of yellow fever. The deadliness of that disorder increases as we approach the tropics, and there is no doubt that intemperance is one of its chief pre-disposing causes. "From my own knowledge," says the author of "Tropical Diseases," "as well as from the observation of others, I aver that those who drink nothing but water or make it their principal drink, are but little affected by the climate, can undergo the greatest fatigue without inconvenience, and are less subject to the contagion of troublesome or dangerous diseases." "For twenty years," Dr. L. C. Ward writes from Sumatra, "I have had the opportunity of observing the comparative effects of the use of spirituous liquors and less stimulating drinks by different classes of the natives, and I find that while the former expose themselves with impunity to every degree of heat, cold, and wet, the latter can endure neither wet nor cold, for even a short period, without great danger to their health."

The diseases aggravated by the influence of habitual intemperance are not wholly limited to the lower latitudes. "The use of alcoholic drinks," says Dr. R. E. Adams, "I have found to be a great pre-disposing cause of malignant disorders. So strong is my opinion on this point that, were I one of the authorities and had the power, I would placard every rum-shop in town with the words: 'Cholera sold here!'"

Cholera has repeatedly spread as far north as Edinburgh and Boston, but, as in yellow fever epidemics, the percentage of mortality increases with the distance from the poles, and for one Scotchman or New Englander victimized by such consequences of intemperance, a dozen Southlanders would risk to pay their vice with their lives, or transmit to generations of their offspring the indirect penalties of a ruined constitution.

The effects of gluttony, too, are counteracted by the antidote of a low temperature. "High livers should emigrate to high latitudes," writes Dr. Atkinson from the banks of the Lena, "in this climate it is certainly difficult, if not actually impossible, to eat to a physically damaging excess. I have put myself outside of plate after plate-full of fried gull's eggs, fried fish, fried seal-liver, with *entremets* of caviare and toast, till I felt positively ashamed of myself, but my appetite failed to diminish, and the deserved consequences forgot to arrive. A temperature of fifteen degrees under zero in September seems to compensate its victims by making them surfeit-proof." A little further south that immunity is less absolute; but even in the latitude of New England we find that the consequences

*On the death of the Emperor Julian, A. D. 363.

of gastronomic excesses are less disastrous in midwinter than in midsummer. Gastric chills, cholera morbus, and acute dyspepsia are ten times more frequent in July than in August, and the gluttons of the lower latitudes have to pay a proportionally heavier penalty. Luigi Cornaro, the Venetian reformer estimates that by dietetic excess alone, his next relatives had shortened their normal life-term some thirty per cent. His father, his uncle, his brother, and several of his cousins had all died before the attainment of their fiftieth year, while their philosophical relative died a week before the celebration of his hundredth birthday. To accomplish his purpose, he had, however, to restrict himself to a daily allowance of twelve ounces of solid food and fourteen of fluids, while several northern centenarians (Parr, Jenkins, Ivan Darapski, etc.) though abstemious in the use of strong drink, were anything but sparing eaters.

Nearly every form of hereditary disorder assumes a more malignant form in the climate of the lower latitudes, and the history of superstition would almost tempt us to apply the same rule to certain moral and mental aberrations. Only under the influence of a torrid climate crimes against nature could be practiced in the name of religion (*vid.* the *ne-plus-ultras* mentioned in Letourneau's *Sociology*, pp. 64, 71 and 72), and only under the sun of the tropics credulity could degenerate into an actual love of the absurd for its own sake—a passion for portents redeemed neither by pathos nor fancy. The miracle legends of the north are mere trifles compared with the prodigies of the Mediterranean creeds, which in their turn are distanced by the limitless absurdities of the Hindoo scriptures. "Among an immense number of similar facts," says Henry Buckle, "we find it recorded that in ancient times the duration of the life of common men was 80,000 years, and that holy men lived to be upwards of 100,000. Some died a little sooner, others a little later; but in the most flourishing period of antiquity, if we take all classes together, 100,000 years was the average. Of one king, whose name was Yudhishthir, it is casually mentioned that he reigned 27,000 years, while another, called Alarka reigned 66,000. They were cut off in their prime, since there are several instances of the early poets living about half a million. But the most remarkable case is that of a very shining character in Indian history, who united in his single person the functions of a king and a saint. This eminent man lived in a pure and virtuous age, and his days were, indeed, long in the land, since, when he was made king, he was *two million* years old; he then reigned 6,300,000 years, having done which, he resigned his empire and lingered on for some 100,000 years more." (*History of Civilization*, p. 97.)

In the latitude of the North German woodlands, on the other hand, even the comparatively modest miracles of the trinitarian missionaries were accepted only under protest, and for nearly seven centuries a latent skepticism awaited the opportunity offered at last in the outbreak of the Protestant Revolt.

(To be continued.)

THE ETHICS OF LITERARY DISCUSSION.

The ethics of literary discussion can be expressed in one sentence: Let the search for truth be your supreme maxim to which all other interests must be subordinate and subservient. Controversies which (not unlike duels) are waged for mere personal matters, have either to conform to this ethical maxim, or if they do not, they will be recognized as downright unethical or at least non-ethical.

The following rules are derived from the ethical maxim of literary discussion:

Never defend an opinion which you do not believe yourself. Never accept a belief which is not demonstrable. You must not only be convinced that it is so, but your arguments must be strong enough to convince impartial readers.

Strength of argument rests on the following conditions:

1. The facts upon which it is based, must be well established.

2. These facts must cover the whole field, so as to be exhaustive as instances.

3. The reasoning must be logical.

4. The presentation of the argument must be lucid.

5. Your presentation cannot be lucid if you are not clear yourself. Accordingly, you must be ready to define every word you use.

6. Technical terms should not be employed unless their definitions are given.

7. Be careful that your words and especially your terms are used as they are commonly understood and not in a double or ambiguous sense.

8. Make the main points prominent and do not lose yourself in matters of detail, however interesting those details may be. They draw the attention of your readers and of yourself from the main subject.

These rules being observed, you can fearlessly await the most powerful adversary.

Before attacking the position of your adversary, try to understand his arguments from his standpoint.

Acknowledge fully where your adversary is right.

Where he uses an ambiguous term, state plainly in what sense the term would be allowable.

This is a matter of justice due to your adversary. To show justice in this way is advantageous first, to your opponent, and then, perhaps in a higher degree, to yourself, and what is most important, to the

problem under discussion. It clears the situation and you thus limit the field of controversy to those points where you know your adversary to be wrong.

The points of agreement have become neutral ground which, it is true, your adversary can use for an honest retreat, if he chooses. However, his annihilation is not the object of the discussion, but the elucidation of truth. If he does not choose the chance of an honest retreat, his defeat will be the more inevitable, the more carefully the field of contest has been limited to his errors.

The weakness of an opponent is generally supposed to be the strength of his antagonist. This is utterly false. It must be a poor cause you defend, if it profits by the weakness of its adversaries. The strength of an adversary adds to your own strength if you defend a cause that is worth defending.

The weakness of an adversary lowers you down to his own intellectual weakness. Therefore, do not have any discussion with weak opponents, and if you cannot avoid an encounter, do not take advantage of their weakness. The common issue is lost sight of by abusing an adversary for his weakness, ignorance, or faults. Consequently, you being the stronger, the duty of helping and promoting your adversary devolves on you. This should be done without ado, simply by giving information.

If your adversary uses rude language or derogatory expressions, there is no need of following his example or of attempting to out do him. Either do not answer his rant at all, or if you cannot avoid giving an answer, ignore all personal dispargement and confine your comments to the cause at issue. If you adopt the railing method of your adversary, you lower yourself to his moral inferiority.

Never use sophisms.

Sophisms easily impose upon large masses, but they do not delude the few independent thinkers who are perhaps silent by-standers. The ultimate result has never as yet depended upon the masses who judge rashly, but upon the judgment of the few independent thinkers who judge slowly but in most cases justly.

Sophisms are dangerous to the parties who employ them; sophisms will ultimately fall back and harm their own inventor. By using sophisms you venture on untenable ground, there to plant your colors, and if your enemy is on the alert, you will lose not only the position but your colors also. Sophisms afford incidental and transitory advantages.

If your adversary by negligence shows a hidden weakness or is guilty of a self-contradiction, point it out to him, stating at the same time how he should have expressed himself from his own standpoint. If his negligence is merely carelessness of verbal expression, you have settled the point for good. However, if the self-contradiction lies deeper, you have thus limited the field of discussion (as suggested above) to those points where the difference of the issues at stake will be seen to be primary and radical.

This always is the end toward which all honest and well directed discussion must tend. Even if the disputants can not gain the best of one another, their discussion must elucidate the problem about which the discussion is waged. The disputants must learn by their discussion in how far they agree and wherein their differences consist: whether it is only a difference of words (which happens much oftener than is generally imagined), or a material difference. If it is a material difference, we must find out by the discussion, whether the difference is fundamental, *i. e.*, whether the parties disagree because they start from different principles (which they have accepted as axioms) or whether it is a different interpretation of facts acknowledged by both parties, or whether one party takes its stand on facts which are not recognized by the other party as sufficiently established.

Whatever should be the result of a discussion conducted upon such ethical maxims, the discussion would never be entirely useless, but would be valuable in exact proportion to the issue at stake and the combined abilities of both opponents. P. C.

ON THE LIFE AND LETTERS OF CHARLES DARWIN.*

BY THE REV. H. H. HIGGINS.

The biography of Darwin affords a reasonable hope that, amongst the abundant and diversified materials therein contained, the key to his success may be found. Mr. Darwin himself thought so. He was at much pains to put on record his own habits and modes of thought, if they were at all likely to be of service to those who should follow him in the pursuit of truth.

Certain reminiscences he himself labelled "important." Two or three of these will be given from the *Autobiography*.

Vol. I. Dating from the Parallel Roads of Glen Roy, Mr. Darwin writes, p. 69:—

"Because no other explanation was possible under the then state of our knowledge, I argued in favor of sea action, *i. e.*, by the elevation and withdrawal of the sea, and my error has been a good lesson to me never to trust in science to the principle of exclusion."

Hasty and over-confident observers are apt to conclude that they know all possible causes for an event, and have only to choose between them. If, then, three or four causes, or apparently all but one, will not fit, they are quite positive the remaining one must be the right cause—there is nothing else left for it, so say they. This is the principle of exclusion, to which Mr. Darwin had learned never to trust in science; and it is the principle on which a well-known writer has built up man's pedigree, step by step, for twenty-three stages, from an Amœba to the human race.

Autobiography, p. 87:—

"I had also, during many years, followed a golden rule, namely, that whenever a published fact, a new observation or a thought, came across me, which was opposed to my general results, to make a memorandum of it without fail, for I had found by experience that such facts and thoughts were far more apt to escape from the memory than favorable ones."

Perhaps this practice of itself might be sufficient to distinguish Mr. Darwin from ordinary men. We are surprised that there are

* Read before the Literary and Philosophical Society in Liverpool, 1887–88.

not more scientific men doing Darwin's kind of work, but how few are ready to give the amount of respectful attention which he did, when facts occur opposed to the "general results" of their thoughts!

In *Reminiscences*, his biographer writes, p. 148:—

"There was one quality of mind which seemed to be of special and extreme advantage in leading him to make discoveries. It was the power of never letting exceptions pass unnoticed."

In Mr. Darwin's pursuit, biology, there is a strong tendency in exceptions to become excessively odious. We need not wonder that the naturalist who never blinked an exception was the one who took the lead in the pursuit after truth.

All these characteristics point to a man of iron determination, merciless to his own foibles. How strong in us are our scientific foibles, and how they beg and entreat to be spared! Few besides naturalists know how powerful is the Στοργή of a scientific writer for the hypothesis over which he has brooded. Darwin was the man to sacrifice all this, thus becoming the man whom Nature hath delighted to honor.

Some of us, and I for one, hold that Darwin's fame would have been dearly bought had it been reached through the bondage of a heart of iron which knew no beat of tenderness nor anything of the throbbing of deep affection.

It was not so with Darwin. Kind-heartedness meanders, like a stream, through all his correspondence, and one brief word shall represent the feelings which dwelt in the home circle. *Reminiscences*, p. 134. The occasion was the death of his daughter, Annie:—

"We have lost the joy of the household and the solace of our old age. She must have known how we loved her. O, that she could now know how deeply, how tenderly, we do still love her dear joyous face! Blessings on her!"

The last of my little notices on Vol. I shall be assigned to Darwin's great work on the Cirripedes, the only monograph he wrote; and to this he devoted eight years of his life.

It was the admirable character of this monograph, and the excellence of its descriptions, which enabled me in 1880 to identify the nameless contents of a large box of Cirripedes, bought by me in London for the Liverpool Museum, with Darwin's own work. They turned out to be the duplicates of the "Beagle" collection, made by Mr. Darwin's own hands. As a relic, they are the greatest treasure we have in the Museum, and still seem to say—At this lowly group of animals DARWIN worked for eight years.

VOL. II. A distinction of no ordinary kind was conferred on the proposed life of Darwin, when Professor Huxley undertook to write in it a chapter on the "Reception of the *Origin of Species*."

The Professor would probably assert that more honor was reflected than conferred by his part in commemorating the life of one whom he ranks with Isaac Newton and Michael Faraday. But a large class of readers will find as much interest in observing the way in which the subject is now treated by Professor Huxley, as in learning the incidents of the struggle through which Darwinism became established.

No living man, more graphically than Huxley, could have described the tactics of the opposition, or enriched the narrative with more telling anecdotes; but whoever opens Vol. II, Chap. V, with the hope and expectation of finding stores of fresh materials for a damaging case against Mr. Darwin's opponents, may perhaps be disappointed.

Professor Huxley does not withhold his condemnation of such as would not fight fairly; but neither does he exult in magnifying the unworthiness of the combatants who were overthrown. Later on, in the same volume, occurs an account of the conflict waged at the Oxford Meeting of the British Association in 1860, between Professor Huxley and the Bishop of Oxford, on which memorable occasion the writer was present.

The narrative does not appear to be at all overdrawn, but the writer is glad to believe that a similar passage at arms could not now occur, inasmuch as there is not a bishop on the bench who does not admit the necessity of treating the subject at least with grave respect.

A motto for this portion of the second volume of Darwin's life might read—Times are changed and we are changed with them. Thirty years ago evolution seemed to carry the black flag, bearing a death's head and crossbones. There is no longer any consistency in renouncing for evolution's sake all that chiefly makes man's life lovely and hopeful.

A deep impression is abroad, though somewhat silently entertained, that Christians and heathen, bishops and philosophers, are all sailing on the same bottom; and, to carry on the metaphor, that the most valuable and reliable seamen are not those who are the loudest renouncers of all old treatises on navigation, but such as do their utmost to make whatever is good and true in the old, work in with the new.

(*To be concluded.*)

RICARDO ANTONIO PROCTOR

VIRO PRÆDITO VIRTUTE MNEMOSYNON.

BY M. C. O'BYRNE.

The murmuring rill in ocean finds its death,
So glides man's life toward the gloomy portal:
Alas! how speedily of every mortal
The memory fades, as fades the parting breath.*

To nobly live the sage's life resigned,
For human good its calm career pursuing,—
Or nobly die for man and man's well-doing,
Alike becomes and proves the generous mind.†

Inspired and cheered by all who knew its worth,—
The hope of fame with altruism blending,—
Such Proctor's life, whose all-unlooked for ending
Awoke a chord of sorrow round the earth.

No fav'rer he of mysteries profound;
His keen eye searched the cosmos to discover
Its hidden meanings, while of Truth a lover
He scorned to feign when angry bigots frowned.

In him reviv'd, we saw the generous fire
That glowed in Bruno's gallant bosom burning;
From Falsehood's compromise with horror turning,
As Bruno spurned the cross from out the pyre.‡

Thrice noble Indagator! thou shalt live
In minds whose *form* is partly thine,—preparing
The way to "vaster issues," still declaring
The glory of the bounty God doth give.

God—the Eternal Order—Being—All:
Of whom we are, in whom we shall be ever;
Changing through all, but deviating never,
Though suns grow dark, men die, or sparrows fall.

---

* φεῦ, τοῦ θανόντος ὡς ταχεῖά τις δρομοῖς.
χάρις διαῤῥεῖ—Sophocles, AJAX, 1266-7.

† ἀλλ' ἢ καλῶς ζῆν, ἢ καλῶς τεθνηκέναι,
τὸν εὐγενῆ χρή.—Ibid. 479-80.

‡ In 1875, Mr. Proctor, upon being informed that certain of his scientific opinions and teachings were opposed to Catholic doctrine, unreservedly abjured and withdrew from the Roman Catholic Church. In 1878, when a well-known London minister alluded to the terrible loss of life resulting from the sinking of the *Princess Alice*, as an example of God's mercy to the survivors, Mr. Proctor and the writer of these lines entered forcible protests against such pulpit utterances. In one of his letters on this occasion, Mr. Proctor wrote thus: "No wonder clergymen complain that Atheism, or what they take to be Atheism, is spreading. Better a hundred-fold to believe in no God at all, than to believe in such a God as some of them picture to us."

BOOK REVIEWS.

SILAS LAPHAM. *W. D. Howells.* Boston: Ticknor & Co.

The above publishing firm follow the paper edition of Mr. Howell's Indian Summer with the issue of Silas Lapham, in the minds of many the author's most powerful and successful book, which needs no word of comment or description here. The myriad readers of Mr. Howard's will be glad of the opportunity to secure a copy of this work in this cheap and available form. C. P. W.

A MEXICAN GIRL. *Frederick Thickstun.* Boston: Ticknor & Co.

A story something like those of Bret Harte in *locale*, dealing with the picturesque scenery and events found on the Mexican coast, but possessing a moral purpose, and written in an earnest, elegant style that far outruns the somewhat hackneyed products of the first author's pen. Mr. Thickstun's descriptive writing is very good, his analysis of character excellent, and portrayal of struggling human emotions and passions most vivid and effective. C.P.W.

AULNEY TOWER. *Blanche Willis Howard.* Boston: Ticknor & Co.

Miss Howard is known as a writer who has done some very good work, and some of a rather indifferent order. Aulney Tower is a fairly good story, both from the point of view of plot and execution. It deals with the fortunes of a decaying Legitimist family on the border line between two hostile nations during the Franco-Prussian war. The motive of the story is found in the struggling emotions of love and patriotism in the heroine, who presents the type of a noble, refined, courageous womanhood. Some of the minor characters in the book are also well conceived and wrought out. C. P. W.

ESSAYS ON GOD AND MAN; or, a Philosophical Inquiry into the Principles of Religion. *Rev. Henry Truro Bray*, M. A., B. D., LL. D. Rector of Christ Church, Boonville, Mo. St. Louis: 1888. Nixon-Jones Printing Co.

The scholarly author is a most radical rector of a Christian church; bold in his thought and accepting its consequences. He proves that God is immanent in the Universe, that the Bible, as the other bibles in the world, is, in the highest sense, but the history of the attempts of the people to express the impression made on the mind by God immanent in nature. The author does not penetrate to Monism; he remains satisfied with "some reasons in proof of the immortality of the soul" instead of solving the problem by plainly showing what is immortal and what is perishable in man. The immanent immortality of Monism has been discussed in an editorial of No. 25, of THE OPEN COURT.

The book is full of pertinent quotations from all sources. They form in themselves an interesting collection, but we must confess that they are so numerous that sometimes the author himself is entirely lost sight of.

THE LOST MANUSCRIPT.*

BY GUSTAV FREYTAG.

CHAPTER XXIII—Continued.

The actress fondled the dog in her arms.

"The rogue is very much spoilt; he creeps into my muff when I go to the theatre, and I am obliged to take him with me. I was lately frightened to death on his account; for once, while I was lamenting as Clara among the citizens, Billy had run out of the green-room and, standing between the curtains, began to wag his tail and caper about on his hind legs."

"That must have been very pathetic," said Mrs. Hummel.

"I moved about more than usual," replied the actress, "and at every turn in the scene I had to call out, 'Lie down, Billy.'"

"Excellent," nodded Mr. Hummel; "always presence of mind."

"To-day I am thankful to the naughty little creature, though," continued the actress, "for he has afforded me the opportunity of making the acquaintance of my neighbors. Mr. Hummel, I believe?"

Mr. Hummel bowed awkwardly. The actress turned to the ladies with a bow, and the latter answered her greeting silently.

There was much in the lady that pleased Mr. Hummel. She was pretty, had a gay and cheerful countenance, and wore something on her bonnet with which he was personally acquainted. He therefore moved a chair towards her and said, with another bow:

"Will you not have the kindness to take a seat?"

The actress bowed in accepting it, and, turning to Laura, said:

"I rejoice to be able to approach you at last. You are no stranger to me, and you have often given me great pleasure, and I am glad to be able to-day to thank you for it."

"Where was it?" asked Laura, embarassed.

"Where you would certainly never have thought of it," replied the other. "I have keen eyes, and over the footlights I observe the face of every spectator. You cannot imagine how painful that is to me sometimes. As you are always in the same seat, it has often been a great pleasure to me to rest my eyes on your features and observe their interested expression; and more than once, without your knowing it, I have acted for you alone."

"Ha!" thought Laura, "it is Venus." But she felt a chord had been struck which gave out a pure tone. She told the actress how unwillingly she missed any of the plays in which she acted, and that in their house the first question, when they received the new bill of the play, was whether the lady was going to act."

This gave the mother an opportunity of entering into the conversation. The actress spoke warmly of the kindness with which she had everywhere been received. "For the greatest charm of our art is the secret friends that we gain by our acting—people whom otherwise one perhaps never sees, whose names one does not know, yet who take an interest in our life. Then, if by accident one becomes acquainted with these kindly strangers, it is a rich compensation for all the sufferings of our vocation, among which the intrusive homage of common persons is perhaps the greatest."

It was clear she could not reckon the homage of the Doctor among these sufferings.

While the ladies were thus talking together, and

* Translation copyrighted.

Mr. Hummel listened with approbation, some gentlemen approached the table. Mrs. Hummel politely greeted the second tenor, who had once sung for her at the godmother's house, and the worthy father of the stage, who knew Mr. Hummel at the club, began a conversation with him concerning the building of a new theatre. On this subject Mr. Hummel had, as a citizen, a very decided opinion, in which the worthy father quite agreed.

In this way the two parties mingled together, and the table of Mr. Hummel became a centre round which the children of Thalia thronged. While the actress was talking with Mrs. Hummel in a very creditable and domestic manner of the inconveniences of her dwelling, Laura glanced at the Doctor. He was standing some steps from the party, leaning against a tree, looking thoughtfully before him. Laura suddenly moved towards him, and began speaking rapidly: "My father has offended you. I beg your forgiveness."

The Doctor looked up. "It does not pain me," said he, kindly; "I know his way."

"I have talked to her," continued Laura, with trembling voice; "she is clever and amiable, and has an irresistible charm of manner."

"Who?" asked the Doctor; "the actress?"

"Do not attempt concealment with me," continued Laura; "that is unneccssary between us; there is no one on earth who wishes for your happiness more than I do. You need not trouble yourself about others shaking their heads; if you are sure of the love of the lady, all the rest is a secondary consideration."

The Doctor became more and more astonished. "But I do not wish to marry the lady."

"Do not deny it, Fritz Hahn; that ill becomes your truthful nature," rejoined Laura passionately; "I see how well the lady suits you. Since I have seen her, I feel convinced that she is capable of appreciating all that is good and great. Do not hesitate, but venture courageously to seek her heart. Yet I am so troubled about you, Fritz. Your feelings are warm and your judgment sound, but you cling too firmly to that which surrounds you. I tremble, therefore, lest you should make yourself unhappy by not deciding at the right moment upon a course which will appear strange to your family. I know you from my early childhood, and I am sure that your danger always has been to forget yourself for others. You might pass a self-sacrificing existence, which I cannot bear to think of. For I desire that all happiness should be your portion, as your upright heart deserves." Tears coursed down her cheeks, as she looked lovingly upon him.

Every word that she spoke sounded to the Doctor like the trilling of a lark and the chirrup of the cricket. He spoke softly to her: "I do not love the lady; I have never thought of uniting her future with mine."

Laura drew back, and a bright color suffused her face.

"It is a passing acquaintance, nothing more either for her or me; her life belongs to art, and can hardly adapt itself to quiet domestic habits. If I could venture to seek a heart for myself, it would not be hers, but that of another." He looked towards the table, from whence at that moment there came a loud laugh, evidently of Mr. Hummel, and spoke the last words so low that they scarcely reached Laura's ear, and he looked sorrowfully down on the buds of the elderbush in which the young blossoms still lay hidden.

Laura stood motionless, as if touched by the wand of a magician, but the tears still continued to flow down her cheeks. She came very near touching to her lips the cherry of her philopena legend.

Then the merry cockchafers hummed round her, the actress nodded smilingly to her, and her father called her:—the fairy tale was at an end. Laura heard the actress say triumphantly to the Doctor, "He offered me a chair, he is no growling bear after all. And he was so kind to Billy."

When Fritz returned home, he threw off his hat and overcoat, rushed to his writing-table, and took up the little letters in the unknown hand. "It is she," he cried, aloud, "fool that I was to doubt it for one moment." He read all the letters again, and nodded at each. It was his own high-minded, noble maiden who had before disguised herself, now she had shown herself to him as she really was. He waited impatiently for the hour when he should meet her at their friend's. She entered late, greeted him quietly, and was more silent and gentle than usual. When she turned to him she spoke seriously, as to a trusted friend. Her quiet composure became her well. Now she showed herself to him as she was, a refined mind full of true enthusiasm. Prudery and sportive moods had only been the shell that had concealed the sweet kernel. The unassumed caution, too, with which she concealed her feelings among her friends, delighted him. When the next ballad should come, then she would speak to him as she felt, or she would give him permission to write openly to her. The next morning the Doctor counted the minutes till the arrival of the postman. He tore open the door and hastened to meet the man. Fritz received a letter, he broke the cover impatiently, there was not a line from his correspondent; he unfolded the old printed sheet, and read the words of a coarse bacchanalian ditty:

"On the spit with ox and pig,
Clear the green for reel and jig,
Wine and rhyme and wassail-shout,
Pass the flowing bowl about!"

So the honest, simple-minded Doctor asked again: Is it she? or is it possible that it is not?

(To be continued.)

NOTES.

The *Revue Philosophique* for September contains an essay by A. Binet on Moral Responsibility.

The best text book for English readers to study Kant is, to our knowledge, Prof. John Watson's recently published work, *The Philosophy of Kant, as Contained in Extracts from his own Writings*. New York: 1888. MacMillan & Co. The book will soon be reviewed in our columns.

Prof. Thom. H. Jappe, of Davenport, in No. 16 of *The Lehrer Post*, Milwaukee, urges that the instruction of German should be obligatory in all schools, not for the reason that there are so many Germans in this country but because it is the most important language to an English speaking race. In all higher schools, Mr. Jappe says, Latin and German should be obligatory.

"*Wit and Humor; Their Use and Abuse*," by Wm. Matthews, LL. D., is announced for immediate publication by S. C. Griggs & Co., Chicago. Prof. Matthews is one of the most widely read of modern authors. His "Getting on in the World" has had an enormous sale. His books are always strongly characteristic, and few writers have a happier faculty of combining entertainment and instruction.

Suggestibility is by no means peculiar to hypnotized persons. Almost every one is sensitive to suggestion to a certain extent when awake, for in every human being, no matter how skeptical he may consider himself, there exists a certain degree of credulity, and this credulity may be played upon and taken advantage of in a measure. Children can be made to believe the most preposterous statements if they are made with sufficient gravity.—[From "Hypnotism: What it is and what it is not," by Dr. CHRISTIAN A. HERTER, in the *Popular Science Monthly* for October.

A powerful agitation has been started in Germany for modernizing the school system. Prof. W. Preyer has taken a prominent part in the discussion of this subject by publishing a pamphlet "*Naturforschung und Schule*," which denounces the errors of the old scholastic methods and proposes a new plan which will conform to the requirements of science. Prof. Preyer in a private letter informs us that "Dr. Hugo Göring, a man of extraordinary energy intends to found a school on the principles of Biology in Berka on the Werra." Prof. Preyer adds, and we believe he is right, that "America would be a better field for such a school than Germany." We therefore call the attention of those interested in the progress of educational institutions to this new movement in Germany.

FORMER CONTRIBUTIONS TO "THE OPEN COURT."

W. D. GUNNING.

Mr. W. D. Gunning's essay *Katzenjammer*, in No. 1, is a sprightly, half humorous, half serious lay sermon, sending shafts of light into the dark recesses of the mind. Katzenjammer is a German word, which means cat-sickness, and denotes a malady of body and mind which results from night-life. The owl, the night-hawk, the whip-poor-will and all the felines are night-prowlers. Men also have gone astray with the cats and become nocturnal; even Socrates, with all his virtues was somewhat addicted to Katzenjammer. Katzenjammer was a large factor in the decline of Athens and the chief factor in the fall of Rome. What a Katzenjammer's-band was that of Cataline! What Katzenjammer was that of Nero fiddling in the light of burning Rome! Struggle for life drove one member of a certain family higher into the air, and another into the ground. The sun-seeker gained in eye and brain, the earth-burrower lost its eyes and retained only brain enough to guide it through the ground. Such are the fates of the mole and the bat. Igdrasil the tree of life has been pushing its human fruit inward to the shade. We want a peripheral humanity lit by beams of science and sweetened and mellowed by active rays of the sun of righteousness.

WILLIAM J. POTTER.

In the leading essay of No. 1, Mr. Potter discusses the question of the relation of individual existence to the aggregating power and well being of society. Nature in this matter should be our teacher, and the spinal world-plan of nature is the method of differentiation. It is a process of concentrating the forces of existence which is done through the process of self-preservation. This principle of selfism is means only, not an end. Without it there would be stagnation, but the individual organism does not exist for its own sake. Nature's aim is higher, broader, richer life. The end of individual existence is the common good, the general well-being, and here is where the law of ethics and the obligations of religion bear upon social problems. Individual self-interest and enterprise only furnish the rough materials for the meliorations which mark the progress of the higher civilization.

E. P. POWELL.

The American scholar, E. P. Powell, gives his views on "Language" in Nos. 24 and 26. He maintains that language, as a means of communication, is possessed by all the animal creation, even down to the lowest in the scale of being; that all communicate with one another; that all of them have a language to express their wants and especially to express hunger. This lies at the root of the principle of evolution, because "organic development is necessitated in the direction of organic power to express —to speak."

GEN. M. M. TRUMBULL.

In No. 25 Gen. Trumbull has an article on "The Value of Doubt in the Study of History." He shows the tendency of historic writing toward exaggeration and falsehood; and he advises teachers to strengthen the minds of pupils by the exercise of doubt. Much of the history of the late war as written by our famous generals is as fabulous as the legend of Romulus and Remus. It is written by men interested in their own story, and therefore it comes under the suspicion cast upon it by the ordinary rules of evidence. "This war history," says Gen. Trumbull, "is woven out of camp-fire yarns." "Like the feet of Chinese children," he says, "our minds were crippled in infancy, and many of them have been lame ever since. They are not as useful to us as they would have been if strengthened in infancy by the exercise of doubt."

EWALD HERING.

Nos. 22 and 23 contain a very eloquent article on "The Specific Energies of the Nervous System," by Dr. Ewald Hering, Professor of Physiology at the University of Prague. His useful additions to physiological science are enumerated in the Encyclopedia Britannica, under the heading of "Physiology." Several pages of the Encyclopedia are devoted to Dr. Hering. His discoveries make an era in physiological study, and we remind our readers of his learned and instructive essay on "Memory," published in Nos. 6 and 7 of THE OPEN COURT.

Dr. Hering's article on the "Specific Energies of the Nervous System," while profound in argument and full of information in its details, is at the same time so simple in statement and so easily understood that the reading of it is a pleasure as well as a study. Such articles enable us to see farther into Nature than we formerly did, and they reveal to us that her "specific" work is much of it so delicate and fine that the most powerful microscope cannot make it visible to the material eye of man. Throughout the essay the following proposition is maintained: "The germs of each animal species possess an inherent and innate faculty, viz: a *specific energy* which directs its development in a manner characteristic to this animal and no other. Again, each single germ possesses an individual energy which, in addition to the normal features of its species, secures an individual character to its future development."